

Aqueous Parts Washing Equipment

Background Information

There are two basic approaches to aqueous cleaning, batch processes and continuous processes. The approach your company decides upon will be based on the production levels that you require. For a high production level a continuous process is probably the better choice, while batch processing is sufficient for moderate and lower production level.

Batch Processing

The parts are loaded into the washer in batches. A cleaning operation (washing, rinsing, drying) must be completed for a batch before another operation can be started. Batch processing is labor intensive, so it will require an employee to operate.

Continuous Processing

Parts are loaded continuously into the washer system and are moved through the cleaning system by a conveyor type system. Continuous systems are not labor intensive, so the washer would not need an operator at all times.

The other distinction between models of aqueous parts washers is the method of cleaning that is used. The most commonly used methods of cleaning are immersion cleaning, spray cleaning, and ultrasonic cleaning. These methods are briefly described below.

Immersion Cleaning

The parts are dipped into cleaner-filled tanks. The cleaning solution may be agitated and/or heated to improve cleaning. Immersion is often a batch process.

Spray Cleaning

Spray cleaners increase the cleaning ability by combining the cleaning chemistry with physical cleaning (sprayer). Spray cleaning may be batch or continuous.

Ultrasonic Cleaning

Ultrasonic cleaning is a special type of immersion cleaning in which high frequency vibrations are transmitted through the solution to produce a scrubbing action. It is effective in cleaning very small parts.

Purchasing Guidelines

The following equipment purchasing guidelines were developed by the Wisconsin Department of Natural Resources to help Wisconsin businesses identify and evaluate pollution prevention opportunities. Although it is not possible to cover every aspect of equipment selection, the list covers some of the more important points and provides considerations for evaluating aqueous parts washing equipment.

What is the configuration and size of the part to be washed?

- Does the configuration or size lend itself to spray washing or immersion?
- Does the part have grooves or cavities that may require a special cleaning method?
- Will the configuration of the part promote "drag-out"? Drag-out is contamination of the rinse solution by dirty wash solution that remains on the part after it has been removed from the wash stage.

Does the material from which the part is made make it susceptible to damage from the washing method you are considering?

What is the quantity of parts to be washed?

- Smaller quantities can be handled efficiently in batch systems, while large quantities may be more efficiently handled in a continuous process system.

What specific functions must the cleaning equipment perform?

- Will the cleaning solution need to be heated?
- Is a dryer system necessary to remove moisture from the part immediately after washing?
- Is a multi-stage process necessary to increase the cleanliness of the parts?
- Is an oil separator/skimmer an available equipment option?

What are the contaminants that need to be removed?

- Is the proposed cleaning agent compatible with the type of equipment to be used?
- If immersion cleaning is going to be used, will the contaminants be suspended in the cleaning solution or will they settle to the bottom of the tank?
- Would the contaminant be more easily removed with the aid of physical or mechanical treatment?

What are the time constraints on the process?

- Is the cycle time required in seconds, minutes, or hours?
- Will a batch system be fast enough or will a belt-driven or monorail-driven continuous process be required?
- Could an ultrasonic cleaner reduce the cycle time?

Will the equipment manufacturer provide a test cleaning of your parts for your inspection?**Will the cleaned parts meet the cleanliness standards of your clients?****What are the wastewater treatment requirements for the contaminated cleaning solution and rinse water?**

- If you discharge to a public sewer, contact your Wisconsin DNR wastewater pretreatment specialist and your local publicly owned wastewater treatment plant (POTW) to determine wastewater regulations.
- State law requires that plans and specifications be submitted to the Wisconsin DNR before installation of wastewater treatment equipment!

What are the wastewater requirements if I am not on public sewer?

- If you discharge to a subsurface soil absorption system (septic tank system), you may only want to consider closed loop cleaning systems. In order to avoid groundwater contamination discharges of industrial wastewater to a septic system are restricted. If discharging is not outright prohibited, then pretreatment of wastewater and a DNR Wisconsin Pollution Discharge Elimination System (WPDES) permit will be required. The pretreatment process must remove all petroleum, volatile organic chemicals, metals, emulsified oil and any toxic wastes prior to discharge to the septic system. Periodic sampling may be required. Contact your DNR wastewater specialist for more information.
- Direct discharges of industrial wastewater to surface waters of the state (streams, lakes and the storm sewers and ditches that lead to them) also require a DNR WPDES permit. Contact your DNR wastewater specialist for more information.

What operations are to be performed immediately after cleaning?

- Will the parts be painted, plated, or galvanized?
- Will these operations be affected by the aqueous washer?

Will the parts need to be handled automatically or can they be handled manually?

What are the power requirements of the equipment? Is it energy efficient?

Are there any local, state or federal health and safety or environmental regulations that apply to the use of this equipment?

- Depending on the type of industry using this equipment, there may be categorical effluent standards that apply to discharge of process wastewater.

Suppliers and Manufacturers Lists

The Wisconsin Department of Natural Resources (DNR) Hazardous Waste Minimization Program developed the following lists of suppliers and manufacturers of aqueous parts washing equipment as a service to Wisconsin businesses. This is not a complete list of available suppliers/distributors and manufacturers. **The lists also are not an endorsement of any of the specific manufacturers or suppliers listed.** The DNR, by providing the list, makes no representation that the products will or will not ensure compliance with environmental and safety laws in any specific application. Hazardous waste generators are advised to thoroughly evaluate the services and compliance status of any company or equipment that they use to manage their hazardous wastes. Contact your local waste-water treatment plant to determine any applicable discharge requirements and avoid discharging industrial wastewater to septic systems. Other local, state, or federal laws may also apply. If you have questions or corrections regarding this list contact the Hazardous Waste Minimization Program at 608/267-3763.

AQUEOUS PARTS CLEANING EQUIPMENT: LOCAL SUPPLIERS AND DISTRIBUTORS*

Company Address	P:Phone F:FAX	Manufacturers Products
BTM Environmental 218 Berwyn Ave Green Bay, WI 54302	P:414/468-8560 F:414/468-8561	Sanborn Technologies
C&S Sales 1131 South 110th St West Allis, WI 53214	P:414/771-5790 F:414/771-3790	JS Mannor
Creeden & Associates, Ltd k425 Huehl Road - Unit 3B Northbrook, IL 60062	P:708/291-4110 F:708/291-4119	Simple Green

Elkhorn Chemical Co. One Elko Lane Box 80 Elkhorn, WI 53121	P:414/723-2646 P:800/377-3556 F:414/723-6382	Better Engineering Mnf. Kleer-Flow L.S.
Engman-Taylor Co. 2315 W. Everlt St Appleton, WI 54914	P:414/739-0242 F:414/739-0902	ADF Systems Ltd.
Engman-Taylor Co., Inc. W142 N9351 Fountain Blvd Menomonie Falls, WI 53051	P:414/253-8650 F:414/255-6512	ADF Systems Ltd. Almco Inc.
INOv8, Inc 1240 Clinton St LaCross, WI 54603	P:608/785-2876 F:608/785-2826	Better Engineering Mnf.
Midwest Environmental Systems N88 W16751 Appleton Ave Menomonee Falls, WI 53051 262-253-2299 262-253-1351 Fax		Build All Corp Lewis Corp Ransohoff, Inc.
Midwest Finishing Systems, Inc. 21860 Watertown Rd Bldg. "C" Waukesha, WI 53186- 1388	P:414/798-1880 P:800/854-0030 F:414/798-1522	Almco Inc. J.S. Mannor Dynatec Magnus Equipment FMT Mass Technology Goff Hydro-pulse Roto-Jet Graymills Viking Washer Co Hurricane Co
Milsolv Company Box 444 Butler, WI 53007	P:414/252-5245 F:414/252-3961	Build All Corp
O'Donohue Industries, Inc. 12599 W, Lancaster Ave. P.O Box 305 Butler, WI 53007	P:414/781-2900 F:414/781-6781	Build All Corp Ney Ultrasonics Continental Ramco Intercont Roto-Jet of Amer.

		JB I Tally
Recovery Equipment 216 N. Green Bay Rd. Mequon, WI 53092	P:414/242-9410 F:414/242-5967	Sanborn Technologies
Republic Equipment 4947 N. Elkhart Ave Milwaukee, WI 53217	P:414/962-1416 F:414/332-5033	American Metal Wash Stoelting, Inc. Blue Wave
Schuette Ultrasonics W226 N 887 Eastmound Drive Waukesha, WI 53187	P:414/549-0050 F:414/544-9934	Crest Ultrasonics Corp.

* Includes companies located in Wisconsin and companies that have participated in UWEX's Cleaning Expositions and other Wisconsin cleaning workshops. For other distributors contact the manufacturer directly.

AQUEOUS PART CLEANING EQUIPMENT: MANUFACTURERS

Manufacturers Name and Address	P:Phone F:FAX	# WI Distr a	Type of Aqueous Parts Washing Equipment (Refer below for the key to abbreviations)				
			Tank	Spray	Ultrasonic	Other	Comments
ADF Systems Ltd 1302 19th St N. Humboldt, IA 50548	P:515/332- 5400 F:800/798- 5100	2	IW,TW	BS,CS,CW,CaW		AG,AC	
Advanced Eng. Products, Inc 2544 Barrington Ct. Hayward, CA 94545	P:510/293- 5900 F:510/293- 5948	-			X		
Alliance Manufacturing Inc. P.O. Box 2006 1368 Capital Drive Fond du Lac, WI 54935-2006	P:414/922- 8100 F:414/922- 9500	WI Mnf	IW	CS,BS,CW		HR	
Almco Inc. 507 Front St. Albert Lea, MN 56007	P:507/377- 2102 F:507/377- 0451	1	BW, CS	BS,CS CW, AS,CL	X	AC,CH	
American Metal Wash Inc. 360 Euclid Ave P.O. Box 265 Canonsburg, PA 15317	P:412/746- 4203 F:412/746- 5738	1		BS,CS,CW, CaW,AS,CL, RB		RT	
Better Engineering Mnf Inc	P:800/229- 3380	2		CW,CaW,CL		CC,CH	

8361 Town Center Ct. Baltimore, MD 21236-4964	P:410/931-0000 F:410/931-0053						
BioKleen Environmental Inc. 1004 Perkins Ave. Waukesha, WI 53186	P:414/524-1600 F:414/524-1646	WI Mnf	BW,IW	AS,RB		HR,AC CH	
Blackstone Ultrasonics 9 North Main St. P.O. Box 220 Jamestown, NY 14702-0220	P:800/766-6606 P:716/665-2340 F:716/665-2480	-	X	*	X	RT CB	*Options
Blue Wave Ultrasonics 960 S. Rolff St. Davenport, IA 52802	P:800/373-0144 P:319/322-0144 F:319/322-7180	1			X	AG,RT,CH	
Bowden Industries 1004 Oster Drive Huntsville, AL 35816	P:800/553-3637 P:205/533-3700 F:205/539-7917	-	IW,TWAG		X*	AG	*Oil De-emulsifier
Branson Ultrasonics Corporation 41 Eagle Road Danbury, CT 06813-1961	P:203/796-0400 F:203/796-0381	--	IW,TW		X	AG,RT,HR,CB, CH	
Build-All	P:414/252-	WI		CW		HR	

Corporation (BAC) N59 W14508 Bobolink Avenue Menomonee Falls, WI 53051	3230 F:414/252- 3259	Mnf					
Burgess & Associates, Inc. 33660 Pin Oak Parkway Avon Lake, OH 44012	P:800/899- 2283 F:216-933- 4379	-	OTH*		*		Vibratory thru feed system
Cleanomat 840 Decatur Avenue North Golden Valley, MN 55427-4324	P:800/847- 7804 P:612/591- 9388 F:512/591- 9342	@	CS	CS		HR,CB CC,* CH	*Brush
Continental Equipment Corp. 6103 North 76th St. Milwaukee, WI 53218-0662	P:414/463- 0500 F:414/463- 3199	1	*	BS,CS,CW, CaW,AS,CL, RB*	*	*	*Custom Washing Eq.
Corpane Industries, Inc. 10100 Bluegrass Parkway Louisville, KY 40299	P:502/491- 4433 F:502/491- 9944	@	IW,TW,AG,CS,*	BS,CS,CW, CaW,AS,CL,*	X	AG HR CB	*Custom
Crest Ultrasonics P.O Box 7266 Trenton, NJ 08628- 7266	P:609/883- 4000 F:609/883- 6452 Midwest Office P:708/416-	1			X	RT,CB CC,CH	

	9411						
Electronic Controls Design, Inc (ECD) 4287-A SE International Way Milwaukee, OR 97222-8825	P:800/323-4548 P:503/659-6100 F:503/659-4422	@		BS,AS,CL	X	CB	
Epcon Industrial Systems, INC P.O. Box 7060 The Woodlands, TX 77387	P:409/273-1774 F:409/273-4600	-	BW,CSCBW	CS,CaW		HR	
Flocept 6435 Cecilia Circle Bloomington, MN 55439	P:612/942-8587 F:612/942-7739	-	IW,TWAG,CS,*	BS,CS,CaW,,AS*		RT,HR,CR,CH *	*Custom
F.M.T. Inc 1950 Industrial Dr. Findlay, OH 45840	P:800/878-8011 P:412/422-0768 F:419/422-0072	1 @	BW,IWTW,AG,CS	BS,CS,CW, CaW,AS,CL, RB	X	AG,HR	
FPI Systems 50 Devine Street North Haven, CT 06473	P:203/281-6161 F:203-248-3908	-	BW,CSCBW				
G.M.F. Industries, Inc. Clam Products Division PO Box 6688 Lakeland, FL 33807	P:813/545-5081 F:813/644-5049	1			X		
Goff Hydro-Pulse	P:405/382-	1				OTH*	* Rubber Belt

1 Pleasant Crove Rd. Seminole, OK 74858	6900 F:405/382-7013						Batch Tumbler
Graymills Corporation 3705 Lincoln Ave. Chicago, IL 60613-8673	P:312/248-6825 F:312/477-8673	1	AG,CS	BS,CW,AS		AG	
Greco Brothers Inc. Greco Lane Providence, RI 02909	P:401/421-9306 F:401/274-8910	-	IW				
Hurricane Systems, Inc. PO Box 867 Jackson, MI 49204	P:517/787-3481 F:517/787-2349	1	BW,CBW,TW	BS,CS,CaW, AS,CL			
Hydro Tek 10418 Enterprise Dr. Redlands, CA 92394	P:909/499-9222 F:909/799-9888	1		BS,OTH*			*High pressure
Intercont Products 2600 North Westgate Springfield, MO 65803	P:417/831-5357 F:417/831-0795	1		BS,CS,CW,AS			
JB I Industries 2400-A East Bennett Springfield, MO 65804	P:417/889-6800 F:417/889-2615	-		CS,CW			
JPR Leasing Corporation	P:615/255-7434	-		CW		HR,CC,CH	*Magido US Dist.

PO Box 150146 Nashville, TN 37215	F:615/255-7439						
J.S. Mannor Machine Corp 427 East Judd Street Woodstock, IL 60098	P:800/338-8778 P:815/338-8700 F:815/338-8711	2	BW,IWTW,AGCS, CBW,*	BS,CS,CW, CaW,AS,CL		AG,HR	*Walking beam
Kleer-Flo Company 15151 Technology Drive Eden Prairie, MN 55344	P:800/328-7942 P:612/934-2555 F:512/934-3909	-	IW,AG,CS				
Lewis Corporation 102 Willenbrock Road Oxford, CT 06478-1033	P:800/243-5092 P:203/264-3100 F:203/264-3102	@	IW,TWAG,CS	BS,CS,CW,AS	X*	OTH*	*Custom
L.S. Industries 710 East 17th Wichita, KS 67214	P:316/265-7997 P:800/835-0218	-		CS,CW	X		
Magnus Equipment 2300 St. Clair Ave. Cleveland, OH 441117	P:800/627-6422	1	AG,CS	AS		AG	
The Mart Corporation 2456B Adie Road Maryland Heights, MO 53043	P:314/567-7222 P:314/567-6551	-		CW,CL			

MassTechnology 808 13th Street East Moline, IL 61244-0795	P:309/755-1101 F:309/755-1121	@			X		
Nelson Solid Temp Inc. 3218 Washington Avenue North Minneapolis, MN 55412	P:612/588-5411 F:612/588-5436	-	X				
Ney Ultrasonics 1280 Blue Hills Ave Bloomfield, CT 05002	P:800/962-8822 P:203/286-6149 F:203/286-6150	1	IW,TWAG	BS,AS	X	AG,RT,HR,AG	
Novamax Technologies Inc. 1515 Johnson Road N.W. Atlanta, GA 30318	P:404/799-1292 P:800/366-6682 F:404/799-1873	-				X	
Ramco Equipment Corp. 32 Montgomery Street Hillside, NJ 07205	P:800/553-3650 P:908/687-6700 F:908/687-0653	1	IW,TWAG,CS		X	AG,CB,CC,CH	
Ransohoff Company 4933 Provident Drive Cincinnati, OH 45246	P:513/870-0100 F:513/870-0105			BS,CS,CW,CaW,AS,CL	X		

Roto-Jet of America Co., Inc. 2819 San Fernando Boulevard Burbank, CA 91504	P:818/841-1520 F:818/841-6448	1		BS,CS,CW,AS,CL			
Sanborn Technologies 25 Commercial Drive Wrentham, MA 02093	P:800/343-3381 P:508/384-3181 F:508/384-5346	2				*	*Recycling equipment for parts washers
Simple Green 15922 Pacific Coast Hwy Huntington Harbor, CA	P:800/228-0709 P:310/795-6000 F:310/592-3034		X			CH	
Sonicor Instrument Corporation 100 Wartburg Avenue Copiague, NY 11726	P:516/842-3344 F:516/842-3389	-	X			*	*Robatic washers
Spray Booth Systems, Inc. PO Box 15070 Fort Worth, TX 76119	P:817/572-4029 F:817/483-4625	-		X			Turnkey system
Stoelting, Inc. 502 Highway 67 Kiel, WI 53042-1600	P:414/894-0662 P:800/558-5807 F:800/545-0662	1	CS	BS,CS,AS,CL	X	CB	

Tally Cleaning Systems 332 John Dietsch Blvd Attleboro Falls, MA 02763	P:508/695-1007 F:508/695-6335	2	BW,IWTW, AGCS,CBW,*	BS,CS,CW, CW,AS,CL,RB*	X**	AG,RT,***	*Custom **Hoists ***Cleaning lab
Valiant International Inc. 1180 East Big Beaver Road Troy, MI 48083	P:313/689-9555 F:313-689-1001	-	X				Conveyorized system
Viking Corporation PO Box 12251 Wichita, KS 57277	P:800/835-1096	1	CS,CBW	BS,CW			

Key to Table Abbreviations

Tank

BW = Barrel Washers
IW = Immersion Washers
TW = Turbulating Washers
AG = Single or multi-station agitation machines
CS = Conveyorized System
CBW = Conveyorized Barrel Washers
OTH = Other

State

BS = Batch System
CS = Conveyorized System
CaW = Carousel Washers
AS = Automated System
CL = Closed Loop Cabinet Washer
RB = Recirculating Booth
OTH = Other

Note that the disclaimer also applies to the list of aqueous parts washing equipment manufacturers.

Ultrasonic

X = Ultrasonic
OTH = Other special features

Other

AG = Single or multi-station Agitation Machines
RT = Rototoc Transporter
HR = Heated recirculating parts washer
CB = Semi-aqueous Circuit Board cleaning
CH = Aqueous Cleaning Chemicals
OTH = Other
@ Indicates that there is a supplier or distributor in a CW Cabinet Washers neighboring state

Additional Publications on Aqueous Parts Washing and Solvent Reduction Available from the DNR Hazardous Waste Minimization Program's Pollution Prevention Clearinghouse

General

SW-223 • Cleaning, Opportunity Checklist (DNR 4 pp) 89
SW-259 • The Good, the Bad and the Banned: Solvent Red. (Univ of TN 80 pp) 91
SW-261 • Industrial Cleaning Source Book (UWEX SHWEC 54 pp) 93
SW-700 • Metal Parts Cleaning--Waste Minimization (EPA 50 pp) 530-SW-89-049
SW-751 • Reduction of Toxic Organic Discharges and VOC Emissions Using Plastic Media Blasting (EPA Proj Sum 8 pp) 600-S2-87-014
AM-172 • Solvent Parts Cleaning Environmental Overview (DNR/DOD 7 pp) 95

Wisconsin DNR/SHWEC Case Studies:

SW-240 Apply total quality management techniques to reduce solvent usage, Parker Pen USA (SHWEC 3 pp) 93
TS-020 Elimin. of Haz. Waste Streams Through Product Substitution and Recycling, Krueger International (DNR 4 pp) 95
TS-019 Reduction of solvents in adhesives and cleanup solutions used in production of printed plastic film products, Kroy Incorporated (DNR 3 pp) 95
SW-168 Replace 1,1,1-trichloroethane with citrus-based solvents, GE Medical Systems (DNR 4 pp) 95
SW-161 Replace 1,1,1-trichloroethane with citrus-based solvents, Northern Precision Casting (DNR 4 pp) 95
SW-169 Replace CFCs with aqueous cleaners, GE Medical Systems (DNR 4 pp) 95
SW-162 Replace chlorinated solvents with aqueous detergents for parts cleaning, Briggs and Stratton (DNR 4pp) 95
TS-017 Substitute less toxic solvents for hazardous solvents, Thilmany (DNR 4 pp) 95
SW-165 Use plastic media blasting to strip paint from parts, Gehl Company (DNR 4 pp) 95
TS-014 Substituting methylene chloride with a less toxic substance, Farnam Sealing Systems (DNR 3 pp) 95
SW-281 Zero discharge aqueous cleaning line, Modine Mfg Co (SHWEC 4 pp) 94